

8 Poor Russia, poor show: mobilising a backward economy for war, 1914–1917

Peter Gatrell

The war taught us much, not only that people suffered, but that those who have the best technology, discipline, and machinery come out on top; it is this that the war taught us, and it is a good thing it taught us (V. I. Lenin, cited by Bailes, 1978: 49).

Introduction

Russia's participation in the First World War began on 19 July 1914 and ended on 26 October 1917 (old style), when the Bolshevik Party seized power.¹ In three and a quarter years Russia conscripted 10 per cent of its population and spent on average around 24 per cent of its national income in each year of war. Russia's premature departure from the war nevertheless brought but temporary respite from conflict. Civil war and foreign intervention erupted in the summer of 1918. Only at the very end of 1920 were peacetime conditions restored, by which time the political and socio-economic system had undergone a profound transformation. Russia thus experienced a prolonged period of upheaval, characterised by the mobilisation of resources for war and revolution (Holquist, 2002). These processes were accompanied by demographic shocks, depletion of the capital stock, a rupture of external and internal trade, and (by 1918) the collapse of the currency. This chapter devotes particular attention to the behaviour of the major economic variables, providing a quantitative illustration of the impact of war up to and including the Bolshevik Revolution.

Russia entered the First World War as one of the world's great dynastic empires and with a large and growing economy. A generation of sustained industrialisation, backed in part by foreign direct investment, enabled Russia to begin to close the gap on the west. Literacy rates had risen rapidly, infant mortality rates had begun to fall, and new urban centres were springing up. Even if the political system remained sclerotic, particularly at a national level, Russia had major achievements to its credit, leading the way in experiments with new artistic, literary, and musical forms, and making major scientific and technological advances. More to

the point, a protracted European war did not appear to pose acute difficulties. There were two main reasons for this. First, Russia had embarked on rearmament measures that alarmed the German high command, and stockpiled sufficient munitions for the war it expected to fight (Gatrell, 1994b: 297–301, 320). Second, its territorial size and population conferred advantages upon Russia vis-à-vis its rivals. In particular Russia could draw upon seemingly inexhaustible reserves of domestic manpower and food (Prokopovich, 1918: 3–32; Tugan-Baranovskii, 1915: 269–324). But the war was to demonstrate that size mattered only if resources could be mobilised effectively.

By the end of the war, following the Bolshevik triumph in October 1917, the tsarist dynasty had vanished ignominiously, the territorial unity of the old empire had fragmented, and the Russian economy lay in ruins.² Russia's much-vaunted advantages proved illusory. The bloated wartime army disintegrated, as weary peasant soldiers returned to their villages in order to seize and redistribute privately owned land. A severe food crisis prompted the mass exodus of desperate workers from once thriving urban centres. In the aftermath of revolution, leading cultural figures followed their upper-class patrons into exile. The subsequent civil war (1918–20) vindicated their predictions of further economic catastrophe, although the revolutionaries themselves retained hopes that social divisions would be overcome, cultural activity transformed, and economic advantages disseminated more widely than hitherto. All the same, from a vantage point in 1917 or 1920, this utopia was a distant vision. Russia was beset by economic calamity and social disintegration (Lewin, 1985; McAuley, 1991; Smith, 2002).

I have resisted the temptation to provide a full account of the period of 'War Communism' (Malle, 1985). However, it is important to bear in mind the words of an astute observer of the Russian scene:

In the case of Russia, civil war and revolution followed so closely upon the World War that it is almost impossible for history to measure with any degree of accuracy the effects of the World War itself upon the economic and social life of the country. Those effects were so distorted by the forces let loose in the postwar years and so confused with the disturbances of the revolutionary era that the attempt to isolate the phenomena of the War from the data of civil war has been a task of unparalleled difficulty (James Shotwell, Preface to Struve et al., 1930: ix–x.)

This chapter is a modest attempt to surmount that difficulty.

On the eve

By 1914 Russia had experienced more than a quarter-century of rapid economic growth. To be sure, this spurt was interrupted by a sharp

downturn between 1900 and 1908, a period coinciding with the Russo-Japanese War and the revolutionary upheavals of 1904-6. Yet the long-term trajectory was unmistakable. Total output grew by around 3.4 per cent per annum between 1885 and 1913, and 5 per cent per annum between 1909 and 1913 (Gregory, 1982: 56-7). Most dramatic of all was the transformation of large-scale industry, marked by the emergence of a more modern fuel economy, a modern iron and steel sector, and new industries such as chemicals and electrical engineering (Gatrell and Davies, 1990). Russia's large and notoriously unstable agricultural sector developed at a less dizzying speed. Agriculture was dominated by the production of cereals for household consumption, as well as for the domestic and export markets. (Around 25 per cent of the cereal harvest left the Russian village before the war.) Unpredictable meteorological conditions continued to ensure the volatility of grain production. Yet here too there were signs of progress. Peasants who had taken the opportunity to migrate to western Siberia found prosperity in livestock farming and in the co-operative marketing of dairy products. Meanwhile, land reform encouraged risk-taking peasants to embark upon the complex and fractious business of leaving the traditional land commune and privatising their plots. All this activity was underpinned by investment in railway transport and trade, and by the emergence of a more sophisticated financial services sub-sector (Gatrell, 1986).

The years prior to the war witnessed a sustained increase in government revenue and expenditure. However, the government fought shy of significant fiscal innovation. Direct taxes accounted for just 8 per cent of all revenue, with indirect taxes contributing a further 47 per cent (half of them from the state monopoly on the sale of spirits). The remaining items comprised net receipts from state-owned property. Government expenditure was overwhelmingly devoted to administration, defence, and debt servicing, although the proportion of spending devoted to education and land reform had slowly begun to alter the picture. Total government indebtedness increased in nominal terms but declined from 74 per cent of nominal GDP to 63 per cent between 1900 and 1913. Around three-fifths of government debt was held domestically. Interest charges absorbed 13 per cent of total spending on the eve of war, down from 17 per cent in 1900 (Shebaldin, 1959: 178-9, 190).

A sustained inflow of foreign capital and the expansion of foreign trade testified to Russia's growing integration in the international economy. By 1913 foreign capital accounted for around 41 per cent of total investment in the industrial and banking sectors. In the last prewar quinquennium Russia enjoyed a rapid increase in imports of semi-manufactures and industrial goods, without eroding the healthy surplus on the external

trade account. A potential source of anxiety was Russia's reliance on trade with Germany, which amounted to some 40 per cent of total foreign trade by value (Khromov, 1950: 490-5; McKay, 1970: 26-7).

In per capita terms the Russian economy remained relatively backward. Backcasting from estimates of Soviet GDP in 1937, Angus Maddison finds that Russian GDP per capita in 1913 was around 28 per cent of the US level. This compares with Paul Gregory's finding that Russian GDP was around 11-12 per cent of the US level. Mark Harrison has called into question the validity of the assumptions underlying Gregory's USA-Russia comparison, which is based on nominal national products converted according to official exchange rates in 1913. By contrast, David Parker has argued that Maddison's more generous estimate is untenable; Russian GDP per capita could not have exceeded 18 per cent, given what is known about relative output per worker in Russia and the USA in key sectors such as agriculture and manufacturing (Maddison, 1995; Gregory, 1982: 154-8; eh.eastbloc postings at <http://eh.net/lists/archives/eh.eastbloc>, various dates). Our present knowledge of relative sector productivities is not sufficiently secure to resolve this problem. However, it is worth noting that labour productivity in Russia's leading engineering firms on the eve of war was around 45 per cent of the German level and 30 per cent of that in the USA (Grinevetskii, 1919: 160). In the agricultural sector productivity differentials were unlikely to have been any more favourable to Russia.

Whatever the disparity, it remains the case that Russia's relative economic backwardness imposed substantial difficulties in terms of the country's ability to mobilise resources in wartime. True, Russia entered the war in the knowledge that its armed forces were large and reasonably well supplied with military *matériel*. A hectic burst of rearmament following the abortive war against Japan in 1904-5 saw the re-equipment of Russia's land forces and the creation of a powerful modern navy. In the event, however, tsarist Russia's emphasis on naval rearmament and fortress artillery proved to be badly misplaced (Gatrell, 1994b).

Economic indicators do not tell the whole story. Unresolved social divisions had helped to provoke political and social turmoil between 1905 and 1907. Some contemporaries believed that these divisions would be magnified if Russia went to war. In a famous memorandum prepared in February 1914 a leading member of the ruling elite, Peter Durnovo, issued a stark warning about the dangers of war for Russia's future stability:

The peasant dreams of obtaining a gratuitous share of somebody else's land; the workman, of getting hold of the entire capital and profits of the manufacturer. Beyond this, they have no aspirations. If these slogans are scattered far and wide among the populace, and the Government permits agitation along these lines,

Russia will be flung into anarchy, such as she suffered in the ever-memorable period of troubles in 1905–1906. War with Germany would create exceptionally favourable conditions for such agitation (Golder, 1927: 3–23).

This point is worth emphasising. Growing economic prosperity before the war did not translate into social stability and political harmony. Longstanding peasant and working-class grievances remained acute, and divisions between the state and educated society would bedevil attempts to forge national unity in wartime (Haimson, 2000).

Military misfortune

The resources available to Russia to support its war effort were eroded at the outset. Although the Russian army advanced into Galicia, the German army invaded and occupied western Poland (Lincoln, 1986). In the next phase of the war, Russia lost the territorial advantage it earlier held over Austria-Hungary. The enemy recaptured Galicia and advanced into Russia's south-western territory. Meanwhile, the Germans continued to advance through Poland and the Baltic region. The third phase of the war (1916–17) coincided with a modest revival in Russia's military fortunes, but also with a growing political crisis, social protest, and economic collapse. This period included the downfall of the monarchical regime in February 1917 and the failure of the Provisional Government to counter the growing radicalisation of labour. The final phase (1917–18) included the Bolshevik Revolution, the German military occupation of Ukraine, and a kind of 'phoney civil war' that gave way to full-blown civil war after June 1918.

Military misfortune meant the loss of valuable resources and capacity. Around one-fifth of the total capital stock in Russian industry in 1913 was located on lands that were subsequently lost to Germany (Vainshtein, 1960: 368–9). Total territorial losses corresponded to 15.4 per cent of the territory and 23.3 per cent of the prewar population of European Russia. The loss of territory in 1914 corresponded to 3.7 per cent of prewar national income; further losses in 1915 accounted for 12.4 per cent of national income (Prokopovich, 1917: 69, 129; Kohn and Meyendorff, 1932: 166). Russia was deprived of around one-third of its factories, contributing 20 per cent of annual industrial output in peacetime. Some of these assets (for example, from Riga) made their way to Russian-held territory, but the process of evacuation was not well organised, partly because of a lack of planning and partly because of inadequate transport facilities. In the event, relatively few enterprises were re-established in the rear. It was more common for evacuated equipment

to be redistributed among existing firms on an ad hoc basis (Sidorov, 1973: 213–51).

Russian GDP in World War I

Against this background I attempt to examine the behaviour of Russia's GDP in 1913–18. The only estimate of national income in wartime was compiled in 1918 by the eminent Russian economist S. N. Prokopovich (see table 8.1).

The underlying observations are neither secure nor very extensive. Prokopovich computed his index for industry by tracing output per person in the Donbass coal industry and derived his index of 'agricultural productivity' from estimates of the sown area in forty-five provinces of European Russia. He assembled a composite index by applying the 1913 weights for agriculture and industry (2.2 : 1). There are obvious difficulties with this procedure. One is that the Donbass coal industry cannot be taken as representative of the performance of industry as a whole. Alternative estimates of labour productivity give a somewhat different picture. Second, Prokopovich's data on agriculture overlook the improvement in output in 1915 and underestimate the decline in output in 1917 (see below). Third, no allowance is made for the performance of other sectors and sub-sectors. The cereal harvest represented only between 35 and 50 per cent of the total value of agricultural production in 1913, and cannot necessarily be taken as representative of the entire sector (Wheatcroft, 1990: 81, 266). And since cereals accounted for only around 28 per cent of national income, and large-scale industry for 16 per cent, it is clear that more than half of all economic activity, based upon 1913 sectoral shares, is missing from Prokopovich's estimates.

In a fresh exercise (reported in table 8.2) I have attempted to improve on Prokopovich's estimates, by recalculating his index of agricultural and industrial production and by incorporating other elements of national income. This exercise takes account of some four-fifths of economic activity.

These estimates allow us to draw some broad conclusions about the phases of the war effort. First, Russian national income declined by around 5 per cent during the first year of war. (An eminent economist could nevertheless assert that 'our national economic organism not only is not being destroyed by the war, as we are already seeing in Germany, but is hardly affected by it' (Tugan-Baranovskii, 1915: 319). His view is corroborated by Prokopovich's calculation, although not by the revised estimate presented here.) In 1915 the decline was reversed to a slight extent, contrary to Prokopovich's view. In 1916 national income began to

Table 8.1. *Russia. Prokopovich's estimate of national income, 1913-1918*

| | Agricultural production | Industrial production | National income |
|---------|-------------------------|-----------------------|-----------------|
| 1913/14 | 100.0 | 100.0 | 100.0 |
| 1914/15 | 100.5 | 100.0 | 100.0 |
| 1915/16 | 98.3 | 92.6 | 96.5 |
| 1916/17 | 90.7 | 70.9 | 84.5 |
| 1917/18 | 93.2 | 50.0 | 80.0 |

Source: Prokopovich (1918: 173). See text and Appendix 8.1 for explanation.

Table 8.2. *Russia: alternative estimate of national income, 1913-1917*

| Year | Large-scale industry | Small-scale industry | Agriculture | Forestry |
|------|----------------------|----------------------|-------------|----------|
| 1913 | 100 | 100 | 100 | 100 |
| 1914 | 101 | 98 | 100 | 79 |
| 1915 | 111 | 78 | 110 | 59 |
| 1916 | 104 | 88 | 90 | 31 |
| 1917 | 76 | 78 | 87 | 18 |

| Year | Trade | Transport | Construction | Weighted total |
|------|-------|-----------|--------------|----------------|
| 1913 | 100 | 100 | 100 | 100.0 |
| 1914 | 84 | 73 | 96 | 94.5 |
| 1915 | 68 | 71 | 100 | 95.5 |
| 1916 | 50 | 43 | 81 | 79.8 |
| 1917 | 37 | 29 | 68 | 67.7 |

Source: For explanation see Appendix 8.1. Agriculture refers to the main cereal crops, and excludes sugar-beet and potatoes. Sectoral weights, for 1913, derived from Falkus (1968: 55).

fall – the drop would have been greater but for the resilience of output in large-scale industry. By 1917 national income reached barely two-thirds of its prewar level; this is a sharper rate of decline than that suggested by Prokopovich. The evidence of decline in the output of basic commodities (table 8.3) confirms just how serious the situation had become in 1917.

Industrial production plummeted in the aftermath of the October Revolution. This catastrophic situation was brought about by declining rates of labour productivity, related in turn to an economic, social, and political crisis that engulfed the entire country.

Table 8.3. Russia: output of selected items, 1913-1918

| | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 |
|-------------------------------------|--------|--------|--------|-----------|-----------|-------|
| <i>Agriculture</i> | | | | | | |
| Grains, million tons | 79.7 | 67.8 | 74.3 | 62.5-65.5 | 59.5-62.5 | — |
| Sugar, thousand tons | 1,794 | 2,130 | 2,578 | 2,354 | 2,030 | 1,166 |
| <i>Chemical industry</i> | | | | | | |
| Coal, million tons | 29.05 | 31.95 | 31.48 | 34.46 | 31.23 | 12.97 |
| Crude oil, million tons | 9.23 | 9.13 | 9.30 | 9.88 | 8.73 | 3.84 |
| Iron ore, million tons | 9.21 | 6.54 | 5.27 | 6.64 | 4.95 | 0.77 |
| Steel, million tons | 4.25 | 4.40 | 4.11 | 4.27 | 3.08 | 0.40 |
| Rolled iron and steel, million tons | 3.51 | 3.58 | 3.26 | 3.37 | 2.44 | 0.36 |
| Freight wagons, units | 13,801 | 20,385 | 23,486 | 16,792 | 12,702 | — |
| Locomotives, units | 654 | 763 | 917 | 600 | 420 | — |
| Sulphuric acid, million tons | 32.2 | 98.4 | 156.2 | 39.2 | 34.9 | 5.5 |
| Cement, million gallons | 1,004 | 1,190 | 934 | 884 | 587 | — |
| Cotton consumption, million kg | 391.5 | 453.7 | 401.3 | 461.9 | 332.5 | — |
| <i>War industry</i> | | | | | | |
| Artillery guns, units | — | 285 | 1,654 | 7,238 | 3,538 | — |
| Shells, million | — | 0.66 | 12.56 | 33.07 | 18.66 | — |
| Machine guns, thousands | — | 0.8 | 4.3 | 11.1 | 11.3 | — |
| Rifles, thousands | — | 278 | 860 | 1,321 | 1,120 | — |

| | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 |
|---|-------|-------|-------|-------|-------|---------------------|
| <i>Transport</i> | | | | | | |
| New railway track, km | 1,202 | 2,866 | 2,924 | 4,193 | 977 | - |
| <i>Finance</i> | | | | | | |
| Bank loans on 1 January, million rubles | | 4,741 | 5,075 | 6,044 | 9,359 | 12,500 ^a |
| New capital issues, million rubles | 762 | 354 | 229 | 482 | 848 | - |

^a 14 December 1917.

Sources and notes: USSR interwar territory, unless stated otherwise. Agriculture: grain crops from Wheatcroft (1980: 216-17); sugar (refined and granulated) from Kafengauz (1994: 436). Industry: coal from Kafengauz (1994: 176, 356-7); oil from Kafengauz (1994: 177, 363); iron ore from Kafengauz (1994: 183, 371); steel from Kafengauz (1994: 183); rolled iron and steel products from Kafengauz (1994: 184, 400); Portland cement (in *bochki*, 1 *bochka* = 108.2 imperial gallons) from Kafengauz (1994: 193). Rifles from Golovin (2001: 190); machine guns from Golovin (2001: 195); artillery pieces (3 inch guns) from Golovin (2001: 211); shell (all calibres) from Golovin (2001: 220), all originally from Manikovskii (1930). Sulphuric acid from Kafengauz (1994: 422); cotton consumption from Mendel'son (1964: 269). Railway track, Russian Empire, from Khromov (1950: 462). Bank loans including discount operations, industrial and trade credits, and loans for purchase of stocks and bonds, from Shepelev (1963: 192). Capital issues for companies newly open for business (*otkryto*), plus additional capital raised by existing companies (*zavitcheno*), from Shepelev (1969: 162).

Table 8.4. *Russia: manufacturing output to final demand, 1913-1918*
(per cent)

| | Equipment | Construction goods | Household consumption | Defence |
|------|-----------|--------------------|-----------------------|---------|
| 1913 | 9.1 | 3.7 | 81.8 | 5.4 |
| 1914 | 9.7 | 3.6 | 79.0 | 7.7 |
| 1915 | 7.3 | 3.9 | 68.1 | 20.7 |
| 1916 | 5.4 | 3.9 | 61.9 | 28.8 |
| 1917 | 4.5 | 3.6 | 59.8 | 32.6 |
| 1918 | 5.7 | 1.9 | 85.6 | 6.7 |

Source: Derived from *Trudy TsSU* (1926: vol. I, 41), based upon value of gross output from 2,287 enterprises operating continuously. Final row refers to first half of 1918 only. Equipment includes rolling stock, industrial machinery, and agricultural equipment.

Without an increase in total output, Prokopovich suggested that the Russian war effort curtailed total consumption, reducing it in 1915-16 and 1916-17 to around 57 per cent and 47 per cent respectively of its prewar level (Maslov, 1918: 223; Prokopovich, 1918: 134). We can shed further light on wartime trends by referring to the industrial census of 1918. This revealed that the percentage share of output allocated to defence increased from just over 5 per cent before the war to one-third by 1917 (table 8.4).

The share of output represented by investment goods declined from 13 per cent in 1913 to 9 per cent in 1916, as a result of the collapse in the production of transport equipment (see table 8.3). The proportion absorbed by domestic consumption fell from 82 per cent in 1913 to not much more than 60 per cent by 1916. In terms of gross value, output earmarked for household consumption remained stable through 1915, but in 1916 it fell to 89 per cent of its prewar level, and by 1917 it amounted to less than two-thirds of the prewar figure. (Further corroboration of the prewar allocation of output will be found in the estimate made by Grinevetskii (1919: 166-7).)

At a more disaggregated level it is worth drawing attention to the possibility that rural consumption increased quite markedly until 1916. Something of its magnitude can be deduced from the additional disposable income that accrued to the peasantry as a result of sales (particularly sales of draught animals) to military procurement officials, as well as from transfer payments. On top of this, peasants no longer purchased vodka. A summary of these hypothetical changes is given in table 8.5, which

Table 8.5. Russia: estimated increase in peasants' money income, 1914-1917
(million rubles, current prices)

| | 1914/15 | 1915/16 | 1916/17 |
|--|---------|---------|---------|
| Transfer payments to soldiers' families | 442 | 760 | - |
| Peasants' share | 340 | 585 | - |
| Sale of horses to the army | 300 | 150 | } 476 |
| Other sales to the army | 146 | 526 | |
| Assumed gains from prohibition | 600 | 600 | 600 |
| Additional disposable income (rows 2 + 3 + 4 + 5) | 1,386 | 1,861 | 1,076 |
| Peasants' estimated cash income in 1913 | 1,500 | 1,500 | 1,500 |
| Nominal increase in disposable income relative to 1913 | 92% | 124% | 72% |

Sources and notes: Danilov (1922: 44-5); other sales to army from Dikhtiar (1960: 215-16). Danilov assumed that peasants' share of transfer payments was 77 per cent. He followed Prokopovich in estimating total national income at 12.8 billion rubles in 1913, and assumed that the peasant share was 4.6 billion rubles, of which 1.5 billion were in a monetised form.

suggests that by 1916 Russian peasants may have enjoyed – even without allowing for the consequences of prohibition – a nominal increase of around 85 per cent in their disposable cash income as against 1913. However, caution needs to be exercised in interpreting these figures.

Peasants in the grain-producing regions of Russia refrained from selling increased quantities of cereals at low prevailing prices in 1914-15 – Meyendorff referred to this as 'the Russian peasant's secession from the economic fabric of the nation' – and consumed more of their product, until such time as prices began to rise. In the grain-consuming regions peasants traditionally survived on non-farm activity, such as handicrafts or work in the service sector. Like the permanent urban workforce, villagers here found that money wages did not keep pace with the rising price of foodstuffs (Danilov, 1922: 48-53; Kohn and Meyendorff, 1932: 178). Some elements of the Russian peasantry cushioned themselves against adverse price changes by abjuring monetised transactions. Other consumers had much less freedom for manoeuvre.

Financial policy

The rapid increase in the cost of war is reflected in table 8.6. The rising average daily cost of war can be explained by the increase in the number of men in uniform and by the increase in the price of food and other necessities purchased by the military procurement agencies.

Table 8.6. *Russia: average daily outlay on the war effort, 1914–1917, according to Prokopovich*

| | | Daily outlay, million rubles | Per soldier per day, rubles |
|---------|------------|---------------------------------|--------------------------------|
| 1914 | July–Dec. | 10.0 | 1.8 |
| 1915 | Jan.–June | 17.4 | 2.9 |
| | July–Dec. | 27.9 | 4.1 |
| 1916 | Jan.–June | 33.3 | 3.8 |
| | July–Dec. | 46.3 | 4.2 |
| 1917 | Jan.–June | 55.2 | 4.9 |
| | July–Sept. | 82.3 | 7.5 |
| Average | | 40.8 | 4.7 |

Source: Prokopovich (1918: 82).

These outlays contributed to a sustained budget deficit (Eliacheff, 1919; Michelson et al., 1928). The Russian government had limited options to raise additional revenue, and indeed it deprived itself of a leading source of revenue when the decision was taken to abolish the state monopoly on the sale of vodka, which before the war had brought in 675 million rubles, net of operating expenses. During the first year of the war the Treasury's receipts fell as a result of the general decline in the level of normal economic activity. Increases in the rates of tax on property and in excise duties – tobacco, sugar, and tea – did not compensate for the loss of revenue from the sale of spirits. True, the Treasury derived greater receipts from the transport of freight and passengers (including soldiers), as well as from duties imposed on imports of munitions and other finished goods. In general the increase in the volume of war-related economic activity helped to boost government revenue. The war also witnessed important fiscal innovations, including a tax on companies' excess profits and an income tax, which only came into force in 1917.

The size of the deficit is indicated in table 8.7. To judge from the German and British experience the proportion of wartime expenditure represented by deficit finance was roughly comparable.

The deficit was financed by means of long-term and short-term domestic debt (mostly Treasury bills) and by overseas borrowing (table 8.8). The Ministry of Finances embarked on a massive publicity campaign to encourage greater 'democratic' participation in subscribing to war debt (Strakhov, 2003). In an attempt to capitalise upon the new political atmosphere following the February Revolution, the Provisional Government launched a 'Liberty Loan' (the original term 'Victory Loan' presumably having been

Table 8.7. *Russia: government revenue and outlays, 1913–1918*
(million rubles)

| | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 |
|-----------------------|-------|--------|--------|---------|---------|---------|
| Total outlays | 3,383 | 4,858 | 11,703 | 18,101 | 30,607 | 46,706 |
| Total revenue | 3,417 | 2,898 | 2,828 | 3,975 | 5,700 | 15,580 |
| Balance | 34 | -1,960 | -8,875 | -14,126 | -24,907 | -31,126 |
| Percentage of outlays | 1.0% | -40.3% | -75.8% | -78.3% | -81.4% | -66.6% |

Source: Michelson (1928: 70, 118–19, 129, 144). The 1917 data are from Davies (1958: 8); 1918 data from Malle (1985: 169–71).

Table 8.8. *Russia: financing the budget deficit, 1914–1917*
(million rubles)

| | 1914 | 1915 | 1916 | 1917 |
|-------------------------|-------|--------|--------|--------|
| Total outlays | 4,859 | 11,562 | 18,101 | 30,607 |
| Of which, on war | 1,655 | 8,724 | 14,049 | 26,161 |
| Ordinary revenues | 2,961 | 3,008 | 4,345 | 5,039 |
| Deficit | 1,898 | 8,554 | 13,756 | 25,568 |
| Of which, change in: | | | | |
| Long-term domestic debt | 709 | 2,879 | 4,174 | 3,729 |
| Overseas borrowing | 82 | 2,140 | 3,665 | 2,554 |
| Short-term debt | 805 | 3,176 | 5,611 | 10,844 |

Source: Michelson et al. (1928: 214, 325); Davies (1958: 8).

abandoned as politically insensitive and militarily overambitious). In June 1917, the Petrograd Soviet attempted to assert its authority by calling upon all soviets to compel workers and peasants to subscribe to the loan (critics pointed out that the element of 'liberty' had given way to a forced loan). Middle-class subscribers were deterred by a lack of confidence in the Treasury and by the growing economic and social turmoil; they also complained that the government's tax increases had left them short of funds.

In addition to financing the budget deficit by borrowing, the Russian government also drew upon the so-called free balance accumulated prior to 1914 and held by the Treasury, including unexpended balances from prewar budgets. These sums were substantial, amounting to around 2,612 million rubles during 1914–17. Under wartime legislation the State Bank discounted short-term Treasury bills and printed rubles (the gold

standard provisions having been suspended in July 1914). Generally speaking the note issue lagged behind the deficit, since loans and the free balance covered the deficit. After the October Revolution, however, paper money became the sole means of financing the deficit (Katzenellenbaum, 1925: 69).

In all (July 1914 to September 1917) total war expenditure amounted to 38.65 billion rubles. These outlays had been met as follows: 62 per cent (23.9 billion rubles) by borrowing, 7 per cent (2.6 billion rubles) by using free balances, and 31 per cent (12.0 billion rubles) by the issue of paper notes (Michelson et al., 1928: 220). At the outbreak of war total currency in circulation had been 1.63 billion rubles (Barnett, 2001). By October 1917 total government debt stood at around 39.0 billion rubles, of which around 20 per cent represented externally held debt (23 per cent according to Volobuev, 1962: 379).

The foreign sector

The behaviour of the merchandise account is shown in table 8.9. Cereals of all kinds (wheat in particular) accounted for 40 per cent of exports in 1913, followed by oil. Imports were predominantly machinery of all kinds, metal products, and coal and coke. Russia's reputation as a country with high tariff barriers reflected less a desire to protect specific industries as to generate revenue. Protectionism had done relatively little to support the development of new industries such as chemicals and advanced engineering products, in which Russia continued to rely heavily upon Germany, two-fifths of Russia's foreign trade having been with Germany in 1913 (Raffalovich, 1918: 310). The war was commonly regarded as an opportunity to rid Russia of the 'German yoke' (Nolde, 1928; Lohr, 2003).

Exports were hampered by the closure of established trade routes (the land frontier with Germany and Austria-Hungary, the Black Sea, and the Baltic), and the failure to develop alternative routes to any extent. Critics argued that greater export earnings could have been derived had the government supported the export of luxuries, such as caviar; they also observed that no decisive measures were taken to curtail the import of luxury items until after the February Revolution. The trade deficit grew very quickly. As a consequence the value of the ruble on the foreign exchanges plummeted. Nor were matters helped by the decline in foreign confidence brought about by the military reverses in the summer of 1915, by the failure of the June offensive in 1917, and the constant political turmoil after July 1917 (Michelson et al., 1928: 397-9).

What of other elements of the current account? Chief amongst these were payments made to foreign creditors by the government and by private corporations; net tourist expenditure; and net government

Table 8.9. *Russia: merchandise trade, 1913-1917 (million rubles)*

| | Exports | Imports | Balance |
|------|---------|---------|----------|
| 1913 | 1,520.1 | 1,374.0 | 146.1 |
| 1914 | 956.1 | 1,098.0 | -141.9 |
| 1915 | 401.8 | 1,138.6 | -736.8 |
| 1916 | 577.3 | 2,451.2 | -1,873.9 |
| 1917 | 464.0 | 2,316.7 | -1,852.7 |

Source: Khromov (1950: 455).

spending on orders placed overseas. No information is available on tourist expenditure, which in 1913 amounted to a significant amount (300 million rubles). Only rough approximations can be made of payments to foreign creditors (also significant, at around 150 million rubles on behalf of private companies and 220 million rubles on behalf of the state). We are on slightly more certain ground with foreign orders. Russia ordered substantial quantities of military *matériel* from external sources of supply. One suggestion is that 25 per cent of all war expenditure went overseas up to 30 September 1916 (Raffalovich, 1918: 409). This was likely offset to only a very modest extent by foreign purchases in Russia (France ordered grain, timber, spirits, and mineral products; some Russian troops were also stationed in France).

Thus at our current state of knowledge only a crude estimate of the balance of payments during the war can be provided. (Pasvolsky and Moulton (1924: 42-3) describe the difficulties in arriving at a statement for the war years.) Table 8.10 suggests a possible scenario in 1915 compared to 1913.

Russian deposits in foreign countries amounted to 500 million rubles in 1913 (Pasvolsky and Moulton, 1924: 190). These could be sold off. Russia also shipped gold abroad (according to some accounts around 640 million rubles' worth). Between 1914 and 1917 Russia concluded new loans overseas to a total value of 8,071 million rubles. As is well known, the Bolsheviks cancelled overseas debt and refused to recognise obligations to domestic holders of debt. In calculating the balance of payments of Soviet Russia (c. 1923), Pasvolsky and Moulton estimated that all debt service payments and interest charges amounted to around 687 million rubles in prewar prices; of this around 267 million rubles represented war debt. With 'indispensable imports' of around 1,033 million rubles, Russia needed to generate export earnings of around 1,720 million rubles to meet its obligations. Even without payments on the reconstruction loan they advocated, Russia would be insolvent (Pasvolsky and Moulton, 1924: 135). The only

Table 8.10. *Russia: balance of payments on current account, 1913, 1915, and 1916: a provisional calculation (million rubles)*

| | 1913 | 1915 | 1916 |
|----------------------------|--------|--------|--------|
| <i>Visible items:</i> | | | |
| Visible exports | 1,520 | 402 | 577 |
| Visible imports | -1,374 | -1,138 | -2,451 |
| Balance of visible trade | 146 | -736 | -1,874 |
| <i>Invisible items:</i> | | | |
| Interest on public debt | -221 | -307 | -490 |
| Interest on private debt | -150 | -136 | - |
| Repatriated profits | -30 | -20 | - |
| Net tourist expenditures | -292 | -29 | - |
| Other | -13 | -192 | - |
| Invisible balance | -706 | -684 | - |
| Balance on current account | -578 | -1,420 | - |

Sources and notes: Column 1 Gregory (1982: 98, 324). Column 2, line 5 from OI', cited in Gregory (1982: 324). Estimates of external public debt in 1915 derived from Michelson et al. (1928: 325) and Volobuev (1962: 379). Interest on overseas public debt in 1915 and 1916 is assumed to be 5 per cent on total debt of 6,142 and 9,806 million rubles respectively. Repatriated profits in 1915 are assumed to be 35 per cent of 1913, corresponding to the percentage share of capital held by foreign-owned corporations, reported in Shepelev (1969: 162). Net tourist spending is remittances by Russian emigrants less private and official spending by Russians abroad. Some tourists and students remained abroad, and I have expressed the 1915 figure notionally as 10 per cent of 1913. 'Other' includes net spending overseas. For 1915 see Raffalovich (1918: 409). Part of this was presumably spent as an advance against deliveries; I assume 10 per cent advances on orders. I have assumed no Allied or private spending in Russia. I assume that spending overseas was almost entirely on orders for future deliveries of military equipment and not reflected in current imports.

hope was for an agreed moratorium, giving the economy time to recover from the ravages of war, revolution, and civil war.

Population, employment, and labour productivity

A striking feature of Russia's population history during the war was the size of the contingent drafted into the armed forces. By October 1917 a total of 18.6 million men had been called up (Volkov, 1930: 50). Another important dimension was the large number of displaced persons comprising refugees and prisoners of war. By the beginning of 1918 this displaced population represented 7 per cent of the total population (Gatrell, 1999: 3, 211-15). The numbers far exceeded the size of the workforce in manufacturing industry and mining. (It has not proved possible to estimate the size of the total population directly engaged in war work (table 8.11).)

Table 8.11. *Russia: population, 1914–1917 (USSR prewar territory)*
(millions on 1 January)

| | 1914 | 1915 | 1916 | 1917 | 1918 |
|--------------------------------|-------|-------|-------|-------|-------|
| Total | 139.9 | 142.6 | 142.3 | 142.3 | 140.9 |
| Civilian population | 139.5 | 136.5 | 131.0 | 126.7 | 123.3 |
| Of which, hired labour: | | | | | |
| Agriculture | 3.7 | 2.8 | 1.2 | 1.4 | — |
| Non-agriculture | 1.9 | 2.0 | 2.2 | 2.3 | 1.8 |
| Armed forces | 0.4 | 5.1 | 7.1 | 8.0 | 7.9 |
| Of which: | | | | | |
| On active service | — | 4.2 | 5.2 | 5.2 | — |
| Non-active | 0.4 | 0.9 | 1.9 | 2.8 | 7.9 |
| Displaced population | — | 1.1 | 4.2 | 7.8 | 9.7 |
| Percentage of total population | | 0.8% | 3.0% | 5.5% | 6.9% |
| Of which: | | | | | |
| Refugees | — | 0.9 | 3.3 | 6.1 | 7.4 |
| Prisoners | — | 0.2 | 0.9 | 1.7 | 2.3 |

Source: Volkov (1930: 86–7, 90, 270–1). For a summary of other estimates of population on 1 January 1914 see Vainshtein (1960: 452). Labour employed in factory (large-scale) industry is taken from Mints (1975: 79). Data on agricultural hired labour are not reliable. Estimates here are taken from Rashin (1958: 167), for 1914, Anfimov (1962: 97) for 1916, and Strumilin (1964: 310). Data for 1915 are interpolated as appropriate.

The most obvious wartime change in employment was the conscription of large numbers of men into the army. Around 18.6 million men served in the Russian army during the First World War, including 1.4 million already in uniform at the outbreak of war. The number of mobilised men from rural areas was equivalent to 50.7 per cent of the male population of working age (18 to 60 years). The corresponding figure for urban areas was 24.0 per cent. Overall, mobilisation accounted for around 40.0 per cent of the total male population of working age (Kohn and Meyendorff, 1932: 19–20, 170). The agricultural labour force was badly depleted, as we shall see.

To compensate for these losses employers recruited female and juvenile labour, including refugees (table 8.12). Exemption certificates were eventually granted by a reluctant government. It appears that the mean daily number of hours worked did not increase in 1915, and rose only slightly, by around 6 per cent, in 1916. As a consequence of revolutionary disturbances during the second half of 1917, hours worked in the Moscow region fell to 8.36, compared to an average of 9.58 during the second half of 1916 (Mindlin, 1919: 8–14; Strumilin, 1964: 365). The number of days lost to industrial disputes jumped by nearly 50 per cent between 1913 and 1914, but the strike wave preceded the outbreak of war and

Table 8.12. *Russia: employment in large-scale manufacturing industry, 1913-1918 (USSR territory) and days lost to work stoppages*

| | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 |
|---|-------|-------|-------|-------|-------|-------|
| Shopfloor workers, 000 | 1,844 | 1,876 | 1,988 | 2,193 | 2,274 | 1,798 |
| Percentage of 1913 | 100 | 102 | 108 | 119 | 123 | 98 |
| Female percentage share | 30.7 | 31.8 | 36.0 | 39.6 | 40.2 | 41.2 |
| Juvenile, male and female, percentage share | 10.6 | 11.0 | 12.5 | 14.4 | 12.6 | 12.2 |
| Supervisory and technical, thousands | 11.34 | 12.46 | 13.23 | 14.36 | 15.33 | 12.87 |
| Ratio of shopfloor to supervisory staff | 146 | 138 | 133 | 125 | 115 | 103 |
| Total days lost, millions | 3.863 | 5.755 | 1.863 | 4.649 | 3.823 | - |
| Days lost per strike | 4.35 | 4.30 | 3.45 | 4.88 | 4.39 | - |

Sources and notes: Rows 2-5 derived from Mints (1975: 79). Rows 5 and 6 (*administrativnyi i tekhnicheskii personal i sluzhashchie*) from 2,029 enterprises working continuously (*Trudy TsSU* (1926: 101). These data are not directly comparable with those in row 1 (here 1918 is the first half of the year only). Rows 7 and 8 from Strumilin (1966: 471), 1917, first nine months only.

quickly subsided during the second half of 1914. Strikes revived on a significant scale during 1916, when 4.65 million days were lost. But strikes were typically of brief duration, and no wartime year remotely matched 1905 in intensity, when more than 25 million days were lost and average stoppages lasted for more than a week (Strumilin, 1966: 471). Russian workers were downtrodden but not unpatriotic. Only when they felt betrayed by the liberal politicians after February 1917 did they demand 'workers' control' in industry and turn to the Bolsheviks in large numbers.

One hallmark of Russian backwardness was poor labour productivity. The data on output per person in large-scale industry are presented in tables 8.13 and 8.14.

Some important steps were taken to improve labour productivity during the war. Capital equipment in industry was worked more intensively in order to meet the growth in demand. In some civilian branches, for instance textiles, the average daily utilisation of equipment increased by 50 per cent between 1914 and 1916 (Nol'de, 1918). New patterns of work were introduced, such as a three-shift system in defence factories. Mass production methods and industrial rationalisation, for example concentrating available machine tools at a relatively small number of factories, also generated gains in productivity in the manufacture of shells and explosives (Manikovskii, 1930: vol. 1, 128-31). In other branches

Table 8.13. *Russia: labour productivity in large-scale industry in rubles and 1913 prices, 1913-1918 (USSR pre-1939 territory)*

| | Gross output, million rubles | Employment millions | Hours worked, per day | Employment adjusted for hours worked, millions | Adjusted output per person (col. 1: col. 4) | Adjusted output per person, % of 1913 |
|------|------------------------------|---------------------|-----------------------|--|---|---------------------------------------|
| 1913 | 6,391 | 2.44 | 10.0 | 2.44 | 2,619 | 100 |
| 1914 | 6,429 | 2.48 | 9.7 | 2.40 | 2,679 | 102 |
| 1915 | 7,056 | 2.58 | 9.7 | 2.50 | 2,822 | 108 |
| 1916 | 7,420 | 2.87 | 9.9 | 2.84 | 2,613 | 100 |
| 1917 | 4,780 | 2.89 | 8.9 | 2.57 | 1,860 | 71 |
| 1918 | 2,160 | 2.25 | 8.5 | 1.91 | 1,131 | 43 |

Source: Column 1, gross output of census industry, Gukhman (1929: 173). Column 2 from Mints (1975: 39). Column 3, including overtime, Strumilin (1964: 365).

of industry, the picture was more gloomy. One expert recommended clearer lines of responsibility for different categories of workers. Incentives mattered, but so too did improved equipment and better layout of plant (Grinevetskii, 1919: 155-62). Others pointed instead to the declining availability of foodstuffs and clothing which - particularly in an arduous industry such as mining - made it difficult for workers to maintain energy levels and to stay warm (Sidorov, 1973: 515-19).

The rewards to labour are indicated in table 8.15. Industrial workers in defence-related occupations more than doubled their money wages by 1916. Their relative position vis-à-vis workers in civilian sectors improved. Those who suffered most in terms of real income and consumption were white-collar workers; the differential between shopfloor workers and salaried staff fell from around 4.1 in 1913 to 3.0 in 1916 and 1.8 in 1917. In the upper reaches of society industrial entrepreneurs made higher profits. A study of twenty-one observations from firms in Petrograd showed that net profits increased by 125 per cent between 1913 and 1916, whereas real wages rose by just 32 per cent (Strumilin, 1958: 247). At the greatest disadvantage were those on fixed incomes, including rentiers (Katsenelenbaum, 1917: 74-8; *Trudy TsSU*, 1926: 57). But it was workers - for so long politically disenfranchised and socially despised - and not rentiers who took to the streets in February 1917 in order to overthrow the old regime. Their gains proved to be shortlived, as the Bolshevik regime adopted strategies to improve labour discipline and curtail workers' room for manoeuvre on the shopfloor and at the ballot box.

Table 8.14. *Russia: mean output per day worked, large-scale industry, 1914-1918 (percentage of 1913)*

| | 1914 | 1915 | 1916 | 1917 | 1918 first h |
|-----------------------------|-------|-------|-------|-------|--------------|
| Quarry products | 95.3 | 91.3 | 87.2 | 71.6 | 56.4 |
| Mining | 110.5 | 132.7 | 92.0 | 52.4 | 40.7 |
| Metal working | 89.3 | 113.0 | 107.9 | 70.8 | 40.7 |
| Machine building | 98.3 | 131.6 | 132.1 | 89.4 | 54.2 |
| Wood products | 95.8 | 80.1 | 69.0 | 49.4 | 44.2 |
| Chemicals | 88.8 | 110.2 | 127.2 | 91.7 | 44.4 |
| Food, drink, and drugs | 121.2 | 106.9 | 87.7 | 62.7 | 31.4 |
| Animal products | 106.1 | 106.3 | 99.9 | 79.3 | 86.9 |
| Leather | 96.7 | 88.3 | 84.1 | 70.7 | 62.1 |
| Cotton | 98.8 | 95.1 | 85.1 | 62.2 | 50.8 |
| Silk | 94.8 | 110.2 | 96.8 | 72.9 | 63.0 |
| Flax | 118.2 | 104.7 | 97.7 | 72.1 | 64.7 |
| Hemp | 95.9 | 103.3 | 105.3 | 80.4 | 58.5 |
| Other fabrics | 93.6 | 100.0 | 129.6 | 86.2 | 56.6 |
| Clothing | 106.9 | 127.6 | 130.3 | 127.4 | 91.0 |
| Paper | 96.6 | 92.9 | 86.4 | 71.6 | 42.6 |
| Printing | 89.9 | 80.4 | 85.7 | 85.0 | 92.4 |
| Art and craft items | 77.1 | 94.3 | 66.0 | 56.3 | 83.5 |
| Utilities | 111.5 | 111.1 | 117.8 | 97.9 | 64.8 |
| Large-scale industry, total | 100.9 | 108.3 | 104.1 | 76.0 | 49.7 |

Source: *Trudy TsSU* (1924: 170-1). Derived from estimates of gross output, 1913 prices, at 2,287 enterprises (2,199 in 1918). The mean number of days worked for all enterprises was as follows: 264 days in 1913, 259 in 1914, 268 in 1915, 268 in 1916, 249 in 1917, and 115 for the first six months of 1918.

Table 8.15. *Russia: real wages in industry, 1914-1917 (percentage of 1913)*

| | All industry | Munitions | Military equipment | Other defence | Non-defence |
|------|--------------|-----------|--------------------|---------------|-------------|
| 1914 | 105.0 | 110.9 | 106.7 | 97.4 | 100.3 |
| 1915 | 105.7 | 115.3 | 103.7 | 96.2 | 86.8 |
| 1916 | 107.1 | 122.8 | 102.1 | 93.6 | 84.8 |
| 1917 | 83.3 | 74.7 | 76.2 | 85.9 | 53.9 |

Source: *Trudy TsSU* (1926: 57).

**Industry: output, capital investment,
and the capital stock**

The gross value of output in large-scale industry grew by about 17 per cent between 1913 and 1916, by which time defence requirements accounted for one-quarter of total production. But the aggregate increase disguised the very different fortunes of capital goods (group A in Soviet parlance) and in consumer goods (group B) industries. In 1916, output in group A was already 62 per cent above the 1913 level; by contrast, output of group B was 15 per cent lower. Thereafter both sectors collapsed. In 1917, the output of group A fell sharply; in the following year a catastrophic decline occurred. In group B the sharpest decline was reserved for 1918 (table 8.16).

So far as one can tell, the output of small-scale industry behaved in a less erratic fashion. Production declined at the outbreak of war, but then recovered between 1915 and 1916. (Defence items accounted for around 12 per cent of output in small-scale industry.) Production declined during 1917 and 1918, but at a slower rate than in large-scale industry. At its nadir in 1920, the output of small-scale industry had reached 44 per cent of its prewar level; whereas large-scale industry stagnated at a mere 13 per cent.

Industrial investment during the war years presents a confused picture, complicated by the fact that we know almost nothing about small-scale industry. Contemporary sources testified to an impressive increase in gross investment in large-scale industry. Domestic output of industrial equipment in 1916 was already some 24 per cent higher than in 1913. Supplies were boosted by imports. The overall dynamic of industrial investment in wartime is indicated in table 8.17.

Gross investment in industrial equipment and structures amounted to around 1,050 million rubles between January 1914 and January 1918. Thereafter, with the cessation of imports – the result of the Allied blockade – and the decline in domestic machine-building, virtually no fresh investment took place. The destruction of assets during the civil war reduced the capital stock from the peak it attained at the beginning of 1918. In addition, the intensity with which equipment was used, and the failure subsequently to maintain and repair the capital stock in industry, led to negative net investment after 1918, which lasted well into the 1920s. Certainly, on the eve of the introduction of the New Economic Policy (spring 1921), the stock of industrial assets, after allowing for depreciation, stood 13 per cent below its wartime peak and was no higher than the level attained in January 1914.

Table 8.16. *Russia: gross industrial production, 1913–1921/22 (USSR pre-1939 territory, million rubles and 1913 prices)*

| | Large-scale industry | | | Small-scale industry | Industry, total | Percentage of 1913 |
|------|----------------------|---------------------|---------------------|----------------------|-----------------|--------------------|
| | Total | Group A enterprises | Group B enterprises | | | |
| 1913 | 6,391 | 2,582 | 3,809 | 2,040 | 8,431 | 100 |
| 1914 | 6,429 | 2,726 | 3,703 | 2,000 | 8,429 | 100 |
| 1915 | 7,056 | 3,359 | 3,697 | 1,600 | 8,656 | 103 |
| 1916 | 7,420 | 4,170 | 3,250 | 1,800 | 9,220 | 109 |
| 1917 | 4,780 | 2,667 | 2,113 | 1,600 | 6,380 | 76 |
| 1918 | 2,160 | 980 | 1,180 | 1,500 | 3,660 | 43 |
| 1919 | 955 | 551 | 404 | 1,000 | 1,955 | 23 |
| 1920 | 818 | 396 | 422 | 900 | 1,718 | 20 |

Source: Gukhman (1929: 173, 191).

Table 8.17. *Russia: capital stock in large-scale industry, 1914–1923 (million prewar rubles)*

| | Value of capital stock on 1 January | Annual investment over year | Depreciation over year | Net change over year |
|--------------|-------------------------------------|-----------------------------|------------------------|----------------------|
| 1914 | 3,538 | 327 | 125 | 202 |
| 1915 | 3,740 | 291 | 132 | 159 |
| 1916 | 3,899 | 275 | 138 | 137 |
| 1917 | 4,036 | 153 | 143 | 11 |
| 1918 | 4,047 | 43 | 177 | -134 |
| 1919 | 4,047 | 32 | 231 | -199 |
| 1920 | 3,913 | 20 | 203 | -183 |
| 1921 | 3,715 | 19 | 187 | -168 |
| 1922 | 3,532 | 30 | 183 | -153 |
| 1923 | 3,364 | 42 | 113 | -71 |
| 1923, 1 Oct. | 3,211 | 83 | 114 | -31 |

Source: *Trudy TsSU* (1926: 95–97); Gatrell (1994a: 320).

Agriculture: inputs, output, and food availability

I begin with inputs of labour and capital. The military draft immediately deprived large landowners of around 800,000 agricultural labourers equivalent to two-fifths of the total agricultural labour force before the war. Employers began to substitute refugee and prisoner-of-war labour on a significant scale; by the beginning of 1916 the large estates employed

260,000 prisoners and a year later the numbers had grown to 430,000. Nevertheless, the agricultural hired labour force probably fell by as much as two-thirds between 1913 and 1916. A substantial decline also occurred in the numbers of peasants capable of working their allotment land, the military draft having deprived peasant households of every other able-bodied rural male (Prokopovich, 1917: 135-9; Antsiferov et al., 1930: 117).

The war brought the manufacture of most agricultural equipment and machinery virtually to a halt. Output declined by around 50 per cent between 1913 and 1916. Imports, which had accounted for around 45 per cent of the market in 1913, fell sharply. As a result, total consumption of agricultural machinery by 1916 stood at little more than 10 per cent of its prewar level. Large estates were again badly hit. Peasant farmers could do little but make running repairs (Izmailovskaia, 1920: 52). The mobilisation of draught animals caused further difficulty, particularly on the large estates in the Baltic and Ukraine. By the beginning of 1917 the army had appropriated around 2.10 million horses, equivalent to 10 per cent of the horse population (Prokopovich, 1918: 230). Villagers were left with those animals least suited for strenuous field work. However, the problems should not be exaggerated, since up to one-third of available horse power was not being utilised (Antsiferov et al., 1930: 124-5).

The war did not result in any dramatic curtailment in the sown area on the territory not occupied by enemy troops. During 1914 and 1915 the area sown to food and fodder grains, as well as potatoes, remained slightly above the prewar level (the area sown to grits and minor crops fell quite sharply). In 1916 total sowings probably contracted by just over 5 per cent compared to the 1909-13 average, most of this reduction being accounted for by a reduction in the area sown to bread grains (Kondrat'ev, 1991: 121, 424-5; Wheatcroft, 1980: 38-63). Privately owned farms reduced their sown area by 50 per cent because of the shortage of hired labour. Peasant farmers increased their sowings in 1915 by more than 20 per cent, notably in the black-earth provinces and in Siberia. Peasants in some regions had more land under plough in 1917 than during the previous year (Prokopovich, 1917: 122-3; Antsiferov et al., 1930: 150-1).

Estimates of the wartime cereal crop, on the area continuously in Russian hands, suggest that output in 1914 fell slightly compared to the prewar average (note that there was a bumper harvest in 1913), but that the harvest in 1915 was around 10 per cent above the prewar average. The harvest in 1916 was some 10 per cent lower than in 1909-13 (table 8.18).

The most obvious change in the utilisation of grain came about with the imposition of a blockade on foreign trade; as a result, the export of grain through the Black Sea came to an abrupt standstill. Russia thus had around 11 million additional tons of grain at its disposal, the average

Table 8.18. *Russia: the cereal harvest (percentage of 1909–1913 average)*

| | Total harvest | | | | | |
|------|---------------|------------|-------|-------|-------|--------|
| | Struve | Wheatcroft | Rye | Wheat | Oats | Barley |
| 1913 | 120.4 | 117.8 | 110.9 | 136.3 | 116.3 | 120.4 |
| 1914 | 96.5 | 99.7 | 100.1 | 105.7 | 89.5 | 88.8 |
| 1915 | 110.2 | 109.6 | 123.2 | 112.7 | 98.1 | 97.2 |
| 1916 | 91.3 | 90.3 | 102.7 | 79.6 | 94.7 | 84.7 |
| 1917 | 87.6 | 87.0 | 83.1 | 93.8 | 87.6 | 84.7 |

Source: Struve et al. (1930: 308); Wheatcroft (1980: 216–17). Column 1 refers to fifty-seven provinces of European Russia and Siberia (excluding Poland, the Caucasus and Kuban, Turkestan, Kovno, Courland, Vilna, Grodno, Volynia, Podolia, Yakutsk, and the Far Eastern territories). Totals include the four principal grains listed, plus buckwheat and millet.

annual amount exported in 1909–13. This advantage quickly evaporated. Russian peasants themselves now consumed increased amounts of grain. Part of the extra-rural shipments was destined to feed the large numbers of refugees who crowded into Russia's towns and cities. The Russian army, having swelled from 7.95 million on 31 December 1915 to 9.45 million in 1916 (Golovin, 2001: 186), also purchased large quantities of cereals including buckwheat and millet, which it turned into coarse grain meal, as well as meat, fish, sugar, butter, rice, and vegetable oil, products that the peasantry had consumed in much smaller amounts in peacetime. The large army horse population also received rations well in excess of peacetime consumption norms (Struve et al., 1930: 330–1). This insatiable military and civilian urban demand ruptured peacetime patterns of consumption.

How then did the food deficit help to bring down the tsarist regime and the Provisional Government? There had been catastrophic failures in the cereal harvest, including – within living memory – the famine of 1891, but on each occasion the tsarist regime managed to survive, perhaps because newspapers and church sermons told readers and parishioners that the problems were God-given rather than man-made. But by 1916 the shortages could not be blamed on a failure of the grain harvest. Human, not divine agency was thus invoked. In urban society, a scapegoat emerged in the shape of the middlemen who speculated in stocks of food: the merchants who dealt in grain and the bankers who controlled the trade through issuing credits to the dealers. The government ruled out a nationwide system of food rationing, fearing – ironically – that it would fail and lead to a breakdown of public confidence in the government. Instead, tsarist procurement officers imposed fixed prices on official grain

Table 8.19. *Russia: estimated inter-regional grain balances, 1909/13 to 1917/18 (million tons)*

| Year | NCR | SPR | CPR | EPR | Combined |
|--------------------|------|-------|------|------|----------|
| 1909/13 to 1913/14 | -3.5 | +10.0 | +1.6 | +0.8 | +8.9 |
| 1913/14 | -2.9 | +11.0 | +1.5 | +1.0 | +10.6 |
| 1914/15 | -5.3 | +3.5 | -1.6 | +4.1 | +0.7 |
| 1915/16 | -4.6 | +3.6 | +2.1 | +1.0 | +2.1 |
| 1916/17 | -7.4 | -0.8 | -1.1 | -0.7 | -10.0 |
| 1917/18 | -8.5 | -0.6 | -5.7 | +1.5 | -13.3 |

Source: Estimates of regional production and utilisation from Wheatcroft (n.d.: 17). Abbreviations refer to Northern Consumer Region (NCR), Southern Producer Region (SPR), Central Producer Region (CPR), and Eastern Producer Region (EPR).

purchases. In November 1916 the government attempted to introduce a compulsory grain levy. Peasants in grain-surplus regions responded by withholding grain and consuming a greater proportion of their product. An increase in the prices paid to food producers in summer 1917 did not alter this picture. Some contemporary observers believed that the women and older men left in charge of the household economy refused to sell (Prokopovich, 1917: 138; Bukshpan, 1929: 163; Kondrat'ev, 1991: 195-227; Lih, 1990: 48-56).

Wheatcroft's careful calculations enable us to gauge the hypothetical inter-regional grain balances during the war (table 8.19). This draws attention to the overall surplus on the eve of war. It demonstrates how the complex regional balance of grain production and utilisation came under pressure in 1915 and 1916, before breaking down completely in 1917. This is evident in the failure of the traditional grain-producing regions – the Volga provinces (CPR) and Ukraine (SPR) – to meet local consumption, let alone the needs of the towns in the north (NCR). Russia's urban population increased from 20.5 million on 1 January 1914 to 25.6 million four years later, representing an increase from 14.6 per cent to 18.2 per cent of the total mouths to feed (Poliakov, 1986: 128-50).

War losses: human and physical capital

In table 8.20 I cite the estimates made by the Soviet demographer Volkov of the number of Russian casualties during the war. Cumulatively Russia lost around 1.45 million men, who were either killed on the battlefield or died from wounds and poison gas. Added to these were

Table 8.20. *Russia: numbers of military casualties, 1914-1917 (thousands)*

| | Killed in action | Wounded in action | Died of wounds | Contracted disease | Died of disease | Taken prisoner | POW deaths |
|-------|------------------|-------------------|----------------|--------------------|-----------------|----------------|------------|
| 1914 | 90.9 | 368.4 | 134.8 | 83.1 | 16.4 | 371.7 | 13.3 |
| 1915 | 226.7 | 842.1 | 308.6 | 423.0 | 88.4 | 2,004.5 | 71.5 |
| 1916 | 269.6 | 987.1 | 361.9 | 629.5 | 28.9 | 1,799.9 | 64.2 |
| 1917 | 102.4 | 454.1 | 165.0 | 1,292.6 | 22.0 | 918.2 | 32.9 |
| Total | 689.6 | 2,651.7 | 970.3 | 2,428.2 | 155.7 | 5,094.3 | 181.9 |

Source: Volkov (1930: 54, 56, 59, 60, 68). Prisoners of war are those held in Austrian, German, Turkish, and Bulgarian captivity.

deaths from infectious diseases (typhoid and dysentery were the most common, typhus and cholera the most lethal) and deaths in captivity. These losses were equivalent to 1.1 per cent of the total population, or 4.5 per cent of the male population of working age (Uralis, 1971: 198, 209).

The lives of those who survived were shortened and impaired. Not surprisingly, around three-fifths of disabled soldiers were in the age group from 18 to 29 years. We still await a study of their fortunes in the world of the postwar village (Kohn and Meyendorff, 1932: 141).

In his summary of Russia's vital statistics of fifty provinces of Europe (Russia, Kohn estimated the population deficit (the difference between peacetime rates of natural increase and the growth of given years wartime) at between 4.5 and 5 million 'for the three years of the war. In the absence of war Russia's population would have increased 5.8 million. Instead, the increase was between 0.8 and 1.3 million. He concluded that 'for the whole territory of the former Russian Empire the loss probably exceeds six million persons' (Kohn and Meyendorff, 1932: 128-9).

Limited light only can be shed on the wartime destruction and loss of physical capital. Bogart referred to 'property damage' amounting to some \$1,250 million in Russia and \$1,500 million in Russian Poland but he does not indicate how these figures - together equivalent to 10 per cent of France's losses - are arrived at (Bogart, 1919: 286-7). In the loss of physical capital as follows. Destruction of structures and in the agricultural sector amounted to around 3,570 million rubles (USSR territory), or 19 per cent of the prewar total (Bogart, 1919: 224) (this includes 1918-20 losses). A further indication of the scale of losses is the decline in the real value of the house between 1913 and 1923/4, from around 16,600 million rubles

13,800 million rubles (Strumilin, 1958: 508, 514). Here an increase in the value of rural structures is attributed to the growth in the number of peasant households after 1918, but this was not sufficient to offset a decline of some 23 per cent in the value of urban structures. These losses should be set in the context of Vainshtein's estimate of the prewar stock of physical capital, which he put at 55,884 million rubles on 1 January 1914 (USSR territory) (Vainshtein, 1960: 370-1). This includes 'individual consumption property'. Exclusive of this item, national wealth totalled 44,586 million rubles. Figures for the Russian Empire are 69,193 million rubles and 55,608 million rubles respectively. Shipping losses were probably not significant, given the blockade and consequent immobilisation of Russian vessels in home waters (Bogart puts them at a mere 2 per cent of British losses). I presently have no information on total external disinvestment - the realisation of external assets, the increase in external liabilities, and the decrease in foreign and gold reserves. Vainshtein calculated that Russia held external assets worth 1,068 million rubles on the eve of war; its external liabilities were eight times greater (Vainshtein, 1960: 444-5). This proportion undoubtedly grew as a result of increased government indebtedness.

An estimate of tangible human capital losses means having some indication of the costs of rearing a child to working age. I have not been able to establish these costs with any confidence. At a rough approximation I put the annual cost at around 65 rubles in 1913, based on the cost of maintaining a child in the 1880s, as from Ransel (1988: 203), adding 25 per cent for non-food costs, giving a total of 48 rubles in current prices. This implies that it cost around 780 rubles to bring up a child to a working age of 12 years.

So far as intangible human capital is concerned, the annual cost of elementary education amounted to around 21 rubles per student in 1913. With around three years' schooling (sic), this gives a figure of 63 rubles for the average Russian adult. This is derived from Strumilin (1964: 112); see also Kahan, (1989: 175). Eklof (1986: 293) reports the average length of attendance in the early twentieth century as two and a half years.

Given total casualties of 1.811 million, the tangible and intangible losses of human capital can be put at 1,416 million rubles and 114 million rubles respectively. With a prewar adult population of approximately 118 million (USSR territory), the stock of tangible and intangible human capital was 92,040 million rubles and 7,434 million rubles respectively. This yields total losses of 1.5 per cent, or around half the losses suffered by the UK during the war (table 7.15). Note that as early as 1920 the indefatigable Strumilin had also attempted to compute war losses (Strumilin, 1958: 293-9).

Assessments and aftermath

One interpretation attributes Russia's shortcomings during the First World War to policy makers' neglect of economic organisation and their mishandling of conversion to a war economy:

The mobilization took from the factories those who were essentially needed for the conduct of the war. The only ports left . . . were inadequately equipped for the indispensable imports. The railway system broke down by the end of the first year, and railway repair shops were converted into munition factories. All output being diverted for the needs of the army, the open market was short of everything . . . The removal of Germans from business concerns in Russia led to the employment of a personnel unaccustomed to their task. Non-bureaucratic organisations . . . though in favour of state control, were hampered in their activities by the central government (Kohn and Meyendorff, 1932: 158).

To these difficulties we must add the consequences of civilian population displacement, which imposed a significant cost upon the Treasury and helped to transform the inter-regional food balance.

Yet these difficulties obscured the problems brought about by deep-seated social attitudes, which Meyendorff summarised as Russia's 'structural diversity'. Even after the old regime gave way to a democratic state,

good resolutions could not bring 15 millions of peasant households to throw all their energy into the fight with the external enemy. War lords, whether Emperor or Provisional Government, could not break the temper of the people, the temper of their bureaucracy, nor even secure the loyalty of all sections of the educated classes to help the realisation of the nation's whole strength (Kohn and Meyendorff, 1932: 159).

The population was collectively disengaged from the war effort. Belated attempts to use methods of compulsion by the tsarist regime, and (in 1917) by the Provisional Government, only generated further antagonisms. Russia's dispossessed – workers, peasants, soldiers and sailors – threw their lot in with a dedicated revolutionary elite that was dedicated to withdrawal from the Allied war effort and to restructuring the social and economic fabric.

Meyendorff's use of the term peasant 'energy' directs our attention to deeply embedded economic structures, and thus to the attributes of economic backwardness. Trotsky, representing the most radical force in Russian society, argued that these attributes lay at the core of Russia's misfortunes during the war:

In the matter of military supplies and finances, Russia at war suddenly found itself in slavish dependence on her allies . . . The lack of munitions, the small number of factories for their production, the sparseness of railway lines for their

transportation, soon translated the backwardness of Russia into the familiar language of defeat (Trotsky, 1934: 40).

In his desire to pour scorn on the old regime Trotsky exaggerated the speed of the Russian collapse and passed over the behaviour of the peasantry during the war. But he was right to draw attention to backwardness, which the Bolsheviks resolved to overcome (Bailes, 1978).

Finally, it is difficult to disentangle the consequences of war from those of revolution in 1917. The resurgent struggles between peasants and landlords, on the one hand, and workers and employers, on the other, are well established in the literature (Smith, 2002). In agriculture, the conscription of the peasant population broadened their outlook and confirmed their hatred of the propertied elite. By mobilising some two-fifths of all adult males between the ages of 15 and 49, tsarism paid for the education of an overwhelming revolutionary force. In the urban and rural economy alike, shortages of basic goods translated into hatred of merchants and moneylenders. These conflicts had a devastating impact on the course of economic activity in 1917. In industry established economic links were being ruptured. Grinevetskii spoke of 'industrial separatism', by which he meant the growing tendency of enterprises to enter into direct barter with their suppliers, to renege on existing contracts, and to use a variety of informal methods to secure supplies of fuel and raw materials. Carefully cultivated relationships, not least inter-regional economic links, were being torn asunder. Without social and political stability, sustained investment – including new foreign investment – was a pipe dream, and without investment the prospect of a revival in trade between town and country remained bleak (Grinevetskii, 1919: 199; Maslov, 1918).

Russia's postwar leaders embarked on a revolutionary path of economic development. Whereas many policy makers in western Europe hoped to restore prewar economic arrangements and structures, the Bolsheviks deliberately sought to rupture them. They immediately took a decision to nationalise financial and industrial assets, to redistribute privately owned land, and to institute a monopoly of foreign trade – this in the context of collapsing trade volumes. Not all of these policy decisions were without precedent: the tsarist regime engineered the seizure of privately owned assets on a large scale when it expropriated the businesses and farmsteads owned by German and Jewish subjects of the tsar (Lohr, 2003). But expropriation in 1917–18 was on a quite different scale.

The shock of war lasted until the winter of 1920–1. The Bolsheviks' adversaries – the 'White' armies and armed peasant bands (the 'Greens') – eventually succumbed to a combination of Red Army supremacy and

te Bolshevik conciliation. In March 1921 the New Economic Policy
aced forced grain requisitioning with freedom of internal trade. As a
condition, the new regime embarked on budgetary stabilisation, cur-
cy reform (completed in 1924), and partial de-nationalisation.
ernal economic relations were normalised, at least to the extent of
ging foreign trade agreements and encouraging limited foreign con-
sions. In general, the terms on which the postwar economy was struc-
ed owed everything to a commitment to radical economic and social
ange. On these new foundations, economic growth revived during the
20s, but the prewar level of national income was not restored until at
ast 1928 (Harrison, 1994: 41-2).

Appendix 8.1. Russian national income estimates

Introduction

Estimates of Russian national income in 1913 derive from two main
sources. The first estimate was made by S. N. Prokopovich in 1918.
Prokopovich derived 'net material product' by calculating volumes of
output for agriculture, forestry, fishing, and hunting, large-scale and
small-scale industry, construction, transport, communications, and
trade. In a subsequent study, Falkus revised Prokopovich's estimates
upwards, partly to take account of the actual grain harvest and of prices
prevailing in 1913 (Prokopovich had averaged these for 1909-13), and
partly because Prokopovich had averaged these for 1909-13), and
national income in 1913 for the interwar territory of the USSR that
were inconsistent with his earlier estimates of national income for the
Russian Empire and for the fifty provinces of European Russia (Falkus,
1968). Falkus's recalculation yielded a total of 18,475 million rubles for
the net material product of the Russian Empire and 14,987 million rubles
for the USSR interwar territory.

The second estimate originates with Paul Gregory's study of Russian
national product between 1885 and 1913, which employed end-use
categories of consumption, investment, and government expenditures.
Gregory's own comparison of his estimate of national income with those
of Prokopovich and Falkus indicated a broad measure of agreement.
National income at 1913 market prices reached 18.7 billion rubles in
1913 (in the Russian Empire), equivalent to 16.1 billion rubles for the
Soviet Union in its pre-1939 boundaries (Gregory, 1982: 66). In order to
facilitate comparisons with Prokopovich and Falkus, Gregory adjusted
his estimates of NNP by omitting indirect taxes and surpluses of govern-
ment enterprises. He adjusted the Prokopovich/Falkus estimate of net

Table A8.1. *Russia: output per person in large-scale industry, 1913-1917 (percentage of 1913)*

| | Prokopovich, estimate | Prokopovich method, revised | Alternative estimate |
|------|--------------------------|--------------------------------|-------------------------|
| 1914 | 100.0 | 98.8 | 100.9 |
| 1915 | 92.6 | 98.3 | 110.5 |
| 1916 | 70.9 | 80.4 | 104.1 |
| 1917 | 50.0 | 58.7 | 76.0 |

Source: Column 1 derived from Prokopovich (1918: 173). Column 2 derived from Sheliakin (1930: 39). Column 3 derived from Kafengauz (1994: 211).

material product by incorporating an allowance for services and for net product originating in the rest of the world. Gregory's adjustment of the Prokopovich/Falkus estimates to make them comparable with his definition of national income revealed a close correspondence in terms of the interwar territory of the USSR.

The war years

Large-scale industry I begin with Prokopovich's methodology for identifying trends in industrial production. As explained in the text, Prokopovich derived his estimate of labour productivity in industry from data on coalmining in the Donbass. The trend is shown in table A8.1. I have modified his original index to take account of revised data on labour productivity in the Donbass that were not available to Prokopovich (see column 2). The Donbass suffered from a severe shortage of qualified manpower in 1915 and 1916. During 1917, experienced technical personnel and supervisors quit the mines, whilst some POWs 'sabotaged' production (Prokopovich, 1918: 170-1). There does not appear to be any justification for assuming that this sector was representative of all large-scale industry, particularly before 1917. I have provided an additional estimate, derived from the 1918 industrial census, which covered more than 2,300 enterprises in thirty-one provinces (Vorob'ev, 1923; 1961: 64-5). Owing to military activity, the territorial coverage of the census was confined to the north-west, the west, the central industrial region, the north, the Urals, the central Volga region, the lower Volga region, and the central black earth region. Ukraine, the Caucasus, Siberia, central Asia, and the Far East were excluded. This yields an index of gross output divided by average number of days worked (column 3).

Table A8.2. *Russia: cereal production, rival index numbers*

| Prokopovich | | Wheatcroft | | |
|-------------|------------|------------|-----------|------------|
| Year | Production | Year | Sown area | Production |
| | | 1909-13 | 100 | 100 |
| 1913/14 | 100.0 | 1913 | 104 | 118 |
| 1914/15 | 100.5 | 1914 | 105 | 100 |
| 1915/16 | 98.5 | 1915 | 103 | 110 |
| 1916/17 | 90.7 | 1916 | 95 | 90 |
| 1917/18 | 93.2 | 1917 | 95 | 87 |

Sources and notes: Index in column 2 from Prokopovich (1918: 173). Indexes in columns 4 and 6 from Wheatcroft (n.d.: 5, 7). Wheatcroft carefully examined the data on sown area and yield, noting the importance that attaches to the break in methodology in 1916, when the data from the Central Statistical Committee (whose final report covered the 1915 harvest) were succeeded by the results from the agricultural censuses (1916 and 1917), on sown area, and from local reports on the grain yields.

These revised estimates challenge Prokopovich's finding of a collapse in industrial production in 1916. They also suggest that Prokopovich exaggerated the extent of industrial collapse in 1917.

Agriculture I turn next to agriculture. Prokopovich computed an index of agricultural production derived from estimates of the sown area. I offer alternatives, based upon Wheatcroft's estimates of sown area and of output (table A8.2).

Since the 1913 harvest was a record crop, I have taken the prewar average (1909-13) as the basis for comparisons with the wartime harvest. Wheatcroft's estimates suggest that Prokopovich underestimated sown area (and by implication, output) in 1915. Prokopovich's index (sown area) and Wheatcroft's index for output are more or less in agreement in 1916. Wheatcroft's calculations suggest that Prokopovich underestimated the extent of the decline in 1917.

Other agriculture: forestry For forestry my index is derived from published receipts from state forests. The Carnegie series authors state that gross receipts amounted to 96.1 million rubles in 1913, falling to 78.0 million rubles in 1914 under the impact of labour mobilisation. No figures are given for 1915, but receipts in 1916 (gross annual receipts derived from the monthly average for the first seven months) may have amounted to 66.8 million rubles. In 1917 the corresponding figure was 89.1 million

Table A8.3. *Russia: index of government receipts from forestry, 1914-1917 (percentage of 1913 at 1913 prices)*

| | Percentage of 1913 |
|------|--------------------|
| 1914 | 79.0 |
| 1915 | 58.9 |
| 1916 | 31.3 |
| 1917 | 18.4 |

Source: Michelson et al. (1928: 54, 112, 188); Antsiferov et al. (1930: 238). The price index is that cited in the 1918 industrial census, *Trudy TsSU* (1926: 116-17).

Table A8.4. *Russia: net income from railways, 1913-1916 (million rubles)*

| | 1913 | 1914 | 1915 | 1916 | 1917 |
|------------------------------|-------|-------|-------|-------|------|
| Military lines | 83.3 | 32.9 | -28.3 | -97.8 | - |
| Lines in rear | 173.8 | 138.9 | 189.6 | 164.4 | - |
| Total | 257.1 | 171.8 | 161.3 | 66.6 | - |
| Percentage of 1913 | 100 | 66.8 | 62.7 | 25.9 | - |
| Total | 100 | 66.8 | 62.7 | 25.9 | - |
| Rear lines only, 1913 prices | 100 | 73 | 71 | 43 | (29) |

Source: Bukin (1926: 104). Lines under military control totalled 23,185 km in 1914. Lines under civilian administration totalled 46,273 km. I have adjusted net income in line with the price index in table A8.6 (column 2, right).

rubles. Antsiferov comments that 'so considerable an increase in the gross revenue seems perfectly natural if we consider the activities of the Forestry Department during the war and the increased demand for growing timber on the part of traders' (Antsiferov et al., 1930: 238). I have interpolated a figure for 1915 and adjusted for price changes to derive an index in 1913 prices (table A8.3).

Small-scale industry I have simply relied here on Gukhman's estimate of the trend in output from small-scale enterprise, expressed in 1913 prices. See table 8.12 above.

Rail transport One source puts net income from railways as shown in Table A8.4. The 1913 figures are difficult to relate to those quoted by Prokopovich and Falkus. Other data, such as the volume of passengers and freight, give a very different picture.

Table A8.5. *Russia: an index of railway traffic, 1914-1917*
(percentage of 1913)

| | 1914 | 1915 | 1916 | 1917 |
|----------------------|-------|-------|-------|------|
| Passenger traffic | 112.6 | 125.2 | 148.2 | - |
| Alternative estimate | 129.6 | 179.1 | - | 74.0 |
| Freight traffic | 99.3 | 105.7 | 124.6 | - |
| Alternative estimate | 97.3 | 108.1 | - | 82.0 |

Source: Derived from Sidorov (1973: 601). Alternative estimates are derived from Westwood (1994: 305-6), who notes that 'fluid frontiers compromise these figures'.

I have decided to base my index on net income from railway receipts on those lines under civilian administration, and to adjust them for price changes. My figure for 1917 is a very rough approximation. The index of income (receipts) shows a sharp drop in 1916, although it is clear from table A8.5 that the volume of traffic was greater in that year than in 1913.

Construction Prokopovich and Falkus derived an estimate for income from construction in 1913 from the numbers employed in construction, and from an estimate of labour productivity in construction as per Gosplan's figure for 1925-6. I have found no data on employment in construction during the war. One source suggests that the workforce in the Siberian construction industry fell by 17 per cent between 1913 and 1917 (Zol'nikov, 1969: 53).

I have decided to employ an unweighted average of output per person in two branches of industry producing construction materials, namely brickmaking and cut timber and veneer products (*lesopil'naia i fanernaia promyshlennost'*). The results are reported in table A8.6.

Trade One option is to compute an index based upon government revenue from trade establishments during the war. Unfortunately it has proved impossible to locate the data. Nor have I located any information on the number of trading licences issued during the war, upon which Strumilin relied for his work on internal trade before and after the war. Dikhtiar gives some indication of the value of trade turnover at the main annual fairs at Nizhnii Novgorod and Irbit (Perm province). I have constructed two indexes on the basis of reported transactions and trade licences issued. Since transactions at Nizhnii Novgorod were so much greater than at Irbit, by a factor of around ten, I have used the former in

Table A8.6. *Russia: output per person in branches supplying construction materials, 1913-1917 (rubles per worker and 1913 prices)*

| | Rubles per worker | Percentage of 1913 |
|------|-------------------|--------------------|
| 1913 | 2,245 | 100.0 |
| 1914 | 2,147 | 95.5 |
| 1915 | 2,238 | 99.7 |
| 1916 | 1,815 | 80.8 |
| 1917 | 1,524 | 67.9 |

Source: Derived from Kafengauz (1994: 390-1, 432).

Table A8.7. *Russia: volume of trade at Irbit and Nizhnii Novgorod fairs, 1913-1917*

| | Irbit | | Nizhnii Novgorod | |
|------|--------------------------------|--------------------|------------------|--------------------|
| | Million rubles and 1913 prices | Percentage of 1913 | Licences issued | Percentage of 1913 |
| 1913 | 25.8 | 100 | 2,676 | 100 |
| 1914 | 21.5 | 83 | (2,246) | 84 |
| 1915 | 11.5 | 46 | 1,815 | 68 |
| 1916 | 6.8 | 26 | 1,336 | 50 |
| 1917 | (3.9) | 15 | (989) | 37 |

Source: Derived from Dikhtiar (1960: 206), Raffalovich (1918: 280), and recalculated in 1913 prices. Figures in brackets are approximations only. Nizhnii Novgorod licences are those issued as 'categories 1 and 2'.

my calculations of national income. However, this index has a highly tentative status (see table A8.7).

Price index The behaviour of wholesale and retail prices is shown in table A8.8.

Appendix 8.2: Russian agricultural statistics, 1909/13-1917

No analysis of Russian food production can be undertaken without understanding the conditions under which data were obtained. Prior to the war, the Central Statistical Committee (TsSK) of the Ministry of the Interior

Table A8.8: *Russia: wholesale and retail price indexes, 1913/1914-1918*

| Series | Wholesale prices | | | | | Retail prices | |
|--------|------------------|------|-----|-------------------|----------------------|---------------------|-------------|
| | 1 | 2 | 3 | Exports only 4 | Foodstuffs only 5 | USSR territory 6 | Moscow 7 |
| 1913 | - | 100 | 100 | 100 | 100 | 100 | 100 |
| 1914 | Jan.-June | 100 | 106 | 110 | | 101 | 101 |
| | July-Dec. | 101 | | | 108 | 102 | |
| 1915 | Jan.-June | 115 | 117 | 153 | 138 | 120 | 130 |
| | July-Dec. | 141 | | | 155 | 140 | |
| 1916 | Jan.-June | 238 | 208 | 219 | 196 | 166 | 206 |
| | July-Dec. | 398 | | | 216 | 240 | |
| 1917 | Jan.-June | 702 | 327 | 434 | 311 | 365 | 775 |
| | July-Dec. | 1171 | | | | 982 | |
| 1918 | - | 639 | 953 | | | | |

Sources and notes: Series 1, unknown commodity sample from Sidorov (1960: 147). Series 2 and 3 from *Trudy TsSU* (1926), vypusk 3: 6-49); series 2 raw material inputs to timber, foodstuffs, mineral, leather, and textiles branches of industry, series 3 raw material inputs to other branches of industry, from 1918 industrial census. Series 4 from Kokhn (1926: 20) (thirteen export items listed by Prokopovich). Series 5 Gosplan figures from Kokhn (1926: 20) thirteen food items, quoted on exchanges, 1924-5 wholesale trade weights. Series 6 from Kokhn (1926: 160-1), basket of sixteen food items, nine items of clothing and footwear, four miscellaneous, including soap, fuel, and housing costs, weighted according to working-class household budget in 1918. Series 7, Gosplan index for Moscow city, from *Trudy TsSU* (1926, vypusk 1: 11).

obtained details of the area under crops and sample estimates of the grain yield. Multiplying the sown area by yield gave a total figure for the harvest. Clearly, the results were sensitive to the quality of the raw data on sown area and grain yields. One authority believed that the TsSK underestimated peasant grain sowings but heavily exaggerated the area sown on private estates. The official figures were also thought to have underestimated grain yields (Ivantsov, 1915: 125-30). Ivantsov added that the *zemstvo* estimates might themselves err on the side of caution, given what he took to be a tendency of *volost* scribes to underestimate cereal yields. The TsSK continued to collect such data for the 1914 and the 1915 harvests. In 1916, however, statisticians employed by the *zemstvos* and the municipalities demanded to participate in a fuller all-Russian agricultural census, as part of a strategy to seize control from the tsarist bureaucracy over the collection and processing of economic data. The result was a nationwide census in 1916, repeated again in the following year as part of a process to

establish the conditions for land reform. As a result, the published data for 1916 cannot be compared directly with the TsSK data for 1915 and earlier years. In fact the results of the agricultural census diverged quite sharply from those of the TsSK. *Zemstvo* statisticians claimed that their results gave a more accurate indication of the sown area and concluded that the TsSK data had understated sowings by around 9 per cent. On the other hand, the 1916 and 1917 figures may themselves be distorted by the reluctance of peasant informants to give accurate data, lest they invite official intervention to take grain (Wheatcroft, 1980).

Notes

- 1 Thanks are due to Theo Balderston, Bob Millward, Ruggero Ranieri, and especially Mark Harrison for advice and comments on an earlier version of this chapter.
- 2 The tsarist regime collapsed in February 1917 and was replaced by a Provisional Government, which was in turn overthrown by the Bolsheviks. The Bolsheviks and the German high command agreed an armistice at Brest-Litovsk on 2 December (old style; 15 December according to the western calendar). Following protracted negotiations, interrupted by renewed military action, a peace treaty was signed on 3 March 1918 (new style).

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